

## SECTION 115 - MANHOLES

### 1. GENERAL

Manholes shall be constructed at designated locations, conforming to the drawings and in accordance with the following specifications.

### 2. EXCAVATION AND BACKFILL

Manholes shall be excavated in accordance with Section 102, entitled "Excavation and Embankment," and shall be backfilled in accordance with applicable methods as specified for adjacent trenches under Section 101, entitled "Trench and Backfill."

### 3. BRICK MANHOLES

Mortar shall be composed of one part Masonry cement, one part Portland cement, five parts mortar sand, and sufficient water for workability. For improved workability, hydrated lime may be added in an amount not to exceed 10 pounds per sack of cement. A full 1 inch mortar coating shall be applied to the outside face of the manhole; mortar coating shall be placed progressively as the manhole is constructed. Exposed mortar joints shall be pointed up with mortar and struck flush.

All brick shall be select, hard-burned, sewer brick which will not deteriorate under conditions encountered in sewer manholes. At least two inches on one end of each brick shall meet the requirements of ASTM Designation C32 for grade MA bricks. Bricks shall be laid radially in a full bed of mortar with best end exposed on the inside of manhole. The inside vertical face joint shall not be more than 1/4 inch wide; horizontal joints, maximum 1/2 inch. All voids between bricks and holes in cored brick shall be filled with mortar.

### 4. MANHOLE BASES

Manhole bases shall be constructed to the shape and dimensions shown on the drawings. The concrete shall conform to the Section 202, entitled "Portland Cement Concrete." The concrete grout bottom shall be placed after the sewer pipe is in place and at least four (4) feet of the manhole wall is installed. After the concrete grout bottom has set to sufficient strength to prevent damage, the top portion of the sewer pipe shall be broken out to permit drainage from the manhole bottom to the pipe invert. At junction manholes, the branch line shall be formed of concrete as detailed for brick manholes. All exposed surfaces shall be steel troweled.

### 5. RINGS AND COVERS

All rings and covers shall be manufactured from best quality gray cast iron, shall be of standard design, and shall have clear openings of the dimensions shown on the drawings and a combined weight not less than that designated on the drawings. Covers shall be non-perforated.

### 6. PRECAST REINFORCED CONCRETE MANHOLES

If precast reinforced concrete manholes are used, they shall conform to ASTM Specification C478-70, except for the following modifications.

The minimum shell thickness for precast concrete reinforced risers and cones shall be one-twelfth of the internal diameter plus one inch. Flat slab tops shall have a minimum

thickness of 8 inches for risers up to 48 inches in diameter and 10 inches for larger diameters.

The manhole bases shall be constructed as specified above under "Brick Manholes." The concrete grout bottom shall be placed after the sewer pipe is in place and at least the first section of the manhole wall is installed. After the concrete grout bottom has set to sufficient strength to prevent damage, the top portion of the sewer pipe shall be broken out to permit drainage from the manhole bottom to the pipe invert. At junction manholes, the branch line shall be formed of concrete as detailed for brick manholes. All exposed surfaces shall be steel troweled.

All precast concrete sanitary sewer manholes shall be furnished with a protective PVC sheet liner with locking extensions in accordance with Section 606, entitled "PVC Manhole Liner".

Joints between precast reinforced concrete sections shall be made in accordance with the jointing requirements as specified in Section 606, entitled "PVC Manhole Liner".

The manhole steps in concrete manholes shall be cast in place and not grouted into openings formed or cut into the manhole walls.

The tops of the standard concrete manholes shall be laid with at least two adjustment rings with a minimum vertical distance of 12 inches. These adjustment rings shall be laid adjacent to the bottom of the cast iron manhole ring.

Cement used in the construction of precast reinforced concrete manholes shall conform to the requirements of the Standard Specifications for Portland Cement (ASTM Designation: C150). The compressive strength of the concrete shall be not less than 4,000 psi.

All sewers extending from precast reinforced concrete manholes shall be supported with concrete for a distance of three feet from the outside wall of the manhole.